NATURAL SELECTION IN MAN

And the Evolution of Human Intelligence

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THE theory of natural selection which was advanced by Darwin as an explanation of evolutionary changes is one of remarkable simplicity. It is based on the almost obvious assumption that the members of a species differ in their hereditary qualities and that those individuals which are best adapted to their conditions of life are more apt to survive and propagate than their less fortunate rivals. All that is required, therefore, to demonstrate the actual operation of natural selection is to prove that some variations are better able to survive than others. As a result of several investigations the operation of natural selection is shown to be not merely a plausible possibility, but an actually demonstrated fact. Reasonable difference of opinion, therefore, is only possible as to the extent to which natural selection is operative and how far it affords an adequate explanation of the course of organic evolution.

Now, differential survival rates depend upon two quite distinct factors, both of which may be included under natural selection in the broad sense in which this term was employed by Darwin. The first factor, and one which is the most commonly stressed in discussions of the subject, is the differential death rate, or what has sometimes been termed lethal selection. The second is the differential rate of reproduction, or what Pearson has called reproductive selection. These two forms of selection, or varieties of natural selection, differ in that the first depends upon the preservation of the individual, while the second is concerned primarily not with the individual *per se,* but with its progeny. Fertile organisms may be no more apt to be preserved than relatively sterile ones, but their progeny may come to prevail simply because there are more of them. Frequently high fertility is an adjunct of general vigour and other qualities which aid the individual in the struggle for existence, but in many cases, as notoriously in man, lethal selection commonly works in one direction, and reproductive selection in another. The survival rate, or the net reproductive rate arrived at by deducting deaths from births, is a resultant of the action of these factors. The interaction of these factors varies with time and place. Now they co-operate towards the production of superior types, and again they may work at cross purposes. There is quite general agreement that in our present civilization the differential birth rate is favouring the more rapid production of an inferior breed of humanity which lethal selection is not succeeding in eliminating.

Although reproductive selection just at present is perhaps the most potent factor in modifying the heredity of man we should not lose sight of the ever-active and discriminating operation of mortality. It is to this aspect of our subject that I shall confine myself this evening, and I shall for the time being employ the term natural selection in its narrower sense of a differential death rate. Most discussions of natural selection in man, as in lower forms of life, are concerned with the ability of this theory to afford a theoretical explanation of evolutionary changes. There have been few attempts to demonstrate its actual existence or to determine the extent of its operation. The most important of the earlier efforts to make good this deficiency of our knowledge are due directly or indirectly to Professor

Karl Pearson. It was shown statistically that long life and good health run in families, and that they have a positive correlation with fertility. Hence the strains with long life tend to increase more rapidly than those with shorter life.

The problem of natural selection was also attacked in another manner in the attempt to show that a high death rate in infancy leaves a stronger group of surviving children, as is indicated by a relatively low death rate in the same group in later years. In an elaborate statistical investigation Dr. Snow endeavoured to show on the basis of data from Prussia and England and Wales that when proper allowance is made for various disturbing factors, the infant mortality rate shows a negative correlation with the death rate in childhood. The mathematical labour involved, the statistical pitfalls to be avoided, and the paucity of good data available for treatment probably explain why, with very few exceptions, similar studies have not been made by the methods employed by Pearson and Snow. The result of these investigations on the selective character of infant mortality attracted widespread attention and elicited much comment. Various objections were raised against this work on grounds which I shall not discuss, but granted that the statistical methods employed are sound and that it is established that there is a negative correlation between the death rate of infancy and that of later childhood in the same cohort of individuals, does it necessarily prove that selective elimination is the cause of this relationship? The validity of the reasoning is dependent upon the exclusion of other factors which might cause the same result.

MORTALITY AND IMMUNITY

As I have elsewhere* pointed out, a high death rate in the first year may cause a low death rate in a subsequent year not necessarily as a result of selection, but as a consequence of the fact that many causes of infant mortality produce an immunity among the survivors. Several of the common causes of early death such as measles, scarlet fever, whooping cough, and diphtheria, leave their survivors immunized against a subsequent attack. In the case of diphtheria, it has been shown that epidemics are followed by a larger crop of immunes as revealed by Schick tests, due not only to recovered patients but also to individuals immunized by very mild and usually unnoticed infections. Let us suppose that as a result of an unusual epidemic of contagious diseases there is a high death rate in the first year of life. Let us suppose that another epidemic comes along five years later. The children who were spared and immunized during the first epidemic will suffer a relatively low death rate in their fifth year, and we might thus obtain a negative correlation between the mortality of infancy and that of childhood, whether the diseases concerned were selective or not. It is unfortunate that the influence of immunity is able to bring about the same kind of correlation as that due to differential mortality, because it renders the demonstration of a differential death rate by the methods employed by Pearson and Snow an almost insuperable task.

SEX DIFFERENCES IN DEATH RATES

There is, I believe, strong presumptive evidence of a differential death rate in early life which is furnished by the distribution of sex mortality. It is well known that the death rate of young males is considerably higher than that of young females. The ratio of male and female deaths in the first year of life varies considerably with time and place. Where the infant death rate is high, the mortality of the two sexes comes to be more nearly equal. Where it is low, and in proportion as it is low, we find a relatively high mortality of males. It is a somewhat curious coincidence that this relationship was pointed out independently and nearly at the same time by Dr. F. Lenz, Dr. T. H. C. Stevenson, and in a paper by Miss Goff and myself. The sex

* *Studies in Evolution and Eugenics.* New York, 1923.

ratio at death, or the ratio of male deaths to 100 female deaths, varies from 104 in Chili (1919) where the infant death rate is 304, to 135 in New Zealand (1922-3) where the rate is 43. The conclusion drawn by Miss Goff and the writer was that the male by virtue of his peculiar complex of chromosomes is inherently the weaker sex.

There has been some discussion as to whether the high mortality of young males is due to recessive sex-linked genes, as it demonstrably is in some cases, or, as suggested by Miss Goff and myself, to the peculiarities of male organization—as is evidently the case with the high male death rate from inguinal hernia, and doubtless with the very high relative male mortality from injuries at birth. But whether the frailty of the male is to be attributed more to sex-linked factors or to mere differences in sex, it is evident that it is due to the hereditary constitution of the male sex. Since the reduction of infant mortality has resulted in a relatively high male death rate, it is a fairly good inference that this reduced mortality is due largely to a diminution of deaths which are non-discriminatory or mildly discriminatory as to sex, and therefore have relatively little association with differences in vitality. All admit that many infant deaths are due to causes that are about as apt to kill a healthy baby as a puny one. If such causes are so far as possible removed, the death rate which remains becomes relatively more discriminating on the basis of vitality as it demonstrably is on the basis of sex.

If this be true, the sex ratio at death might be used as a sort of rough index of the selective influence of different causes of mortality. This possibility led me to undertake a compilation of the data on the relative death rates of the two sexes from various causes. The first year of life was chosen on account of the similarity of environmental influences for both sexes during this period and because extensive data were available in our statistics on mortality. The results of this study showed that the sex incidence of death varies greatly with different diseases, as had indeed long been known in certain cases. In general, the male ratio from defects of development, or what might be called faults of organization, is high. This is illustrated in the ratios for malformations of the heart (143.8), intestinal obstruction (162.8), and hernia (371.2), as compared with a ratio of 128 for all causes combined. Nervous diseases, which in large part are due to internal factors, have also a high male ratio, 134.6. Measles, diphtheria, scarlet fever, and enteritis show a relatively low male ratio. The ratio for epidemic diseases in general, excluding the anomalous case of whooping cough, is 124.3. In striking contrast to the preceding, the deaths due to accidental causes show a male ratio only slightly greater than that of the two sexes at birth.

The proneness of the male to die from constitutional causes manifesting themselves in very early life and leading to more frequent defects of organization, the fact that in early infancy when the death rate is highest the male ratio at death is also highest, and the fact that the reduction in infant mortality has taken place largely in the later months of the year leaving neo-natal mortality little affected, all go to indicate a selective influence of mortality associated with inherent differences in constitutional vigour and normality.

INHERITANCE OF VITALITY

Another indication of the selective character of mortality is yielded by the relation between the death rates of parents and their young children. It should be borne in mind that the early death of one or both parents might deprive a young child of proper care and hence lead to an increased liability to death. This objection cannot apply, however, to deaths at advanced ages, when all the offspring are past the period of early youth. If, in such cases, low infant and child mortality is associated with long life of parents, it is reasonable to infer that the low death rates of parents and offspring are both due to the inheritance of superior vitality. This relation has been found by Pearson in his study of pedigrees derived

from the Society of Friends. The percentage of daughters who died under five years of age was found to decrease with increased longevity of both father and mother even in advanced years. Also, the longevity of daughters was found to increase as that of their parents increased. Ploetz has found that the percentage of children dying under five years of age decreases as the parents live to more advanced ages. In a study of parental longevity and infant mortality in two very different groups, the royal families of Europe, and families recorded in American genealogies, I have found, in agreement with Pearson and Ploetz, that where the parents live into advanced age groups there is a marked decrease in the mortality of their children. There seems to be no plausible explanation of all these results, except by the hypothesis that long life in parents is correlated with inherited vigour in infancy.

ELIMINATION OF DEFECTS

If, for lack of adequate data, the statistical studies of natural selection have thus far yielded rather meagre results, we have an abundance of evidence of a differential death rate furnished by our rapidly increasing knowledge of human heredity. To the extent that people die of causes of a hereditary character, to that extent natural selection can be said to be in operation. I shall give, mainly for the purpose of illustration, only a few cases of the selective elimination of hereditary strains. Hæmophilia, popularly known as ' bleeding,' is a strongly hereditary taint, being transmitted usually as a recessive sex-linked character. On account of the difficulty of stopping hæmorrhage, individuals who inherit this trait not infrequently bleed to death. In fact, affected males usually do not reach adult age. There are also several related defects of the blood system that frequently prove fatal.

Gutmann reports a family of 38 persons, 15 of whom died of apoplexy and 5 others suffered from heart disease. Hæmaturia, apparently a Mendelian dominant, although not always completely so, often leads to relatively early death. Among diseases dependent on disorders of metabolism mention may be made of hereditary family jaundice, goitre, and diabetes. Œdema, which, like diabetes, commonly requires the co-operation of an environmental factor, shows a tendency to run in families. Crowder and Crowder give a family pedigree of five generations of œdema of the glottis affecting 20 individuals, 15 of whom met their deaths from this cause. Death may also be attributed to hereditary peculiarities of form. Achondroplastic dwarfs experience great difficulty at childbirth, when a Cæsarian operation is commonly necessary, a fact indicating a strong tendency of natural selection to eliminate such stocks.

If natural selection fails to eradicate strains exhibiting club-foot, syndactylism, and congenital dislocation of the hip, it is because the afflicted individuals are shielded by the helping hands of their fellows. Unquestionably mutual aid has greatly checked the elimination of individuals having many kinds of hereditary disorders. The hereditary anomalies and defects of the eyes, such as cataract, displaced lens, absence of iris, and numerous others are seldom causes of death in our modern, civilized society. Neither is deafness. One can get along with almost any kind of physical deformity and have a reasonable expectation of marrying and attaining old age. It is not upon such anomalies that natural selection is now acting with any considerable degree of vigour. It is rather upon more general and obscure differences in constitution which affect the resistance to disease and cause a proneness to the degenerative maladies of middle and later life. These differences of constitution give rise to proclivities, or diatheses, to various diseases which are not transmitted as clearly defined Mendelian units, although they doubtless depend, like other hereditary characters, on unit factors. We have evident hereditary diatheses to asthma, nephritis, rheumatism, heart disease, and a host of nervous disorders which tend to reduce vitality and shorten life. There are hereditary differences in

susceptibility to various germ diseases, including probably tuberculosis and pneumonia. The problem of a hereditary predisposition to tuberculosis is one of unusual difficulty, on account of familial contagion and the development of immunity by minimal infections in early life; but it is not without significance that hereditary differences in susceptibility to tuberculosis and pneumonia have been demonstrated in animals through carefully controlled experimentation. The strongly hereditary diatheses to cancer which are demonstrable in mice suggest that a similar diathesis may occur in man. And there is a fair amount of evidence from human pedigrees giving independent support to the same conclusion.

SOME RACIAL FACTORS

When we compare the reactions of different races to disease, the evidence of hereditary racial variations in susceptibility is often quite clear. Here there is a great need for caution because differences in food, sanitation, habits of life, and especially in degrees of slowly acquired direct immunization to various infections, afford many opportunities for erroneous interpretations. For these and other reasons the great bulk of the literature on the racial incidence of disease is quite inconclusive as to the real influence of race.

In order possibly to throw some further light on racial susceptibility to disease, I have made a compilation of all of our available data on the mortality of Negroes and whites from various causes in the United States. In general the Negroes have a much higher mortality than the whites, and therefore the fact that there are some diseases from which they suffer relatively little affords all the more evidence of a true racial immunity. As has long been recognized, Negroes have a remarkably low death rate from scarlet fever, the mortality of the whites being frequently over three times that of the blacks. Probably for much the same reason, the Negroes have a very low death rate from erysipelas, since this disease, like scarlet fever, is attributed to a streptococcus invasion. The Negro is also peculiarly resistant to diphtheria and to a somewhat less extent to measles, and he has a very low rate for diseases of the skin.

On the other hand, the high Negro mortality from tuberculosis and pneumonia affords strong presumptive evidence of a hereditary susceptibility to these infections. We may explain a part of the Negro's mortality from these diseases as a result of unfavourable environment, but the fact that our Negro recruits for the late war who passed the same tests for physical fitness as the whites when they were admitted to the army, and were kept under similar conditions in camps, nevertheless showed a rate for lobar pneumonia over three times as high as the whites and a much higher rate also for pulmonary tuberculosis and other respiratory diseases, affords strong evidence of a hereditary diathesis for pulmonary diseases. In the inter-racial struggle going on between Negroes and whites in the United States, the selective influence of diseases is, I am convinced, destined to play an important role. Although different diseases affect the two races in quite different ways, the influence of lethal selection is, on the whole, quite strongly in favour of the whites.

UNDIMINISHED LETHAL SELECTION

While the progress of medicine and hygiene has reduced the action of natural selection in relation to defects and diseases, the contention that this evolutionary factor has been practically eliminated is quite unjustified. In one respect natural selection is probably acting with undiminished, if not actually increased vigour in our present civilization, and that is on the basis of native differences in intelligence. Among the lower forms of mental defectives, which are really pathological in origin, we find a high death rate. Most low-grade idiots die before adolescence. The high death rates among the epileptic, the insane, and other victims of grave nervous disorders indicate that those with hereditary diatheses to such maladies tend to be eliminated by

lethal selection. Among the kind of feeble-minded that we commonly meet with in such stocks as the Jukes and Kallikaks, physical development is probably quite as good as in the rank and file of intelligent people. Nevertheless, the death rate of such stocks is high. Vagabonds, paupers, inebriates, prostitutes, and ne'er-do-wells of all sorts are not, as a rule, good actuarial risks.

SELECTION FOR INTELLIGENCE

The great mass of dull-minded human beings who are incapable of acquiring more than the mere rudiments of education and are unable to succeed in occupations requiring skill or executive ability are forced into the ranks of unskilled and poorly-paid labour. They are compelled to live upon relatively poor food and in insanitary homes; and they suffer from inadequate medical assistance when they are ill. Consequently their mortality is high. If we study tables of occupational mortality the broad general fact will become apparent that the death rate, barring a number of individual exceptions, tends to be high in proportion as the occupation requires little intelligence and skill. In our present industrial society, we find an occupational stratification on the basis of levels of intelligence. The differences in occupational mortality which appear so striking are partly the direct effect of mental differences, and partly an indirect effect resulting from the varied environments into which different mental levels tend to segregate. If we compare the death rates of general shopkeepers or innkeepers with those of clergymen and schoolmasters between the ages of twenty-five and thirty-five, as given in the census report for 1911, we find that the second group has a death rate about five times that of the first. In the next decade, from thirty-five to forty-five years, the death rates of the shopkeepers and innkeepers are about four times as high as those of the clergymen and school teachers, but in the more advanced age groups the mortality of the shopkeepers and innkeepers is reduced to about half of that of their rivals. That these differences in occupational mortality should be relatively larger in the early age groups is of especial significance in relation to natural selection, because the individuals are in the early part of their reproductive period. After the reproductive age relative mortality rates have very little significance for racial heredity.

But another fact of the highest importance in relation to selective mortality is that the death rates of infants vary enormously in different occupational groups, and that this mortality is distributed in much the same way as that of their parents. Tables of infant mortality according to the occupation of the father were compiled for England and Wales after the censuses of 1911 and 1921. Occupations were graded into a few major groups largely on the basis of knowledge and skill. The first consists mainly of the professional classes, the second of semi-professionals, the third of skilled artisans, the fifth of unskilled labourers, while the fourth group is made up chiefly of semi-skilled workers. In the first group infant mortality is strikingly low, 76.4; in the second somewhat higher, 106.4; in the third it is 112.7, and among the unskilled workers 152.5. Although the major occupational classes were not quite the same in the 1921 census, the relation between parental occupation and infant mortality showed much the same gradation as in 1911.

THE EUGENIC SIGNIFICANCE

There is no question that the mortality of some occupational groups is much higher than in others, but the eugenic significance of this fact depends entirely upon the extent to which our occupational groups are characterized by differences in hereditary endowments. Inasmuch as membership of the first group requires rather more than usual mental ability, and since the mentally incapable tend to gravitate into more poorly paid employments, we should expect, *a priori,* to find a certain degree of correspondence between occupational level and in-

telligence level. Thanks to several studies on this subject we have now a considerable body of data which confirms this conclusion. The very extensive series of mental tests given to American Army recruits during the Great War reveal a marked average reduction in the intelligence score as we pass from occupations such as engineering down to unskilled labour. A larger number of researches have been carried out upon the intelligence of children as related to parental occupation. In general the scores show much the same gradation as those of the occupations followed by the parents. Duff and Thompson, in a survey of the intelligence of 15,419 schoolchildren in Northumberland in relation to the occupations of their parents, find a gradation from an intelligence quotient of 112.2 for children of parents in the professional class down to an intelligence quotient of 96 for the children of parents following low-grade and unskilled occupations. Jones and Carr-Saunders report much the same relation between parental occupation and the intelligence of orphan children. In a study of 2,782 children in Wisconsin it was found that there was a range of scores from 115 for children of the professional class, to 89 for those of unskilled labourers, and the intelligence quotients showed a high correlation (0.74 to 0.79) with the intelligence quotients of the fathers' occupations as indicated by the army tests.

It would be possible to adduce the results of several other researches in this field, but as they show a substantial agreement, these illustrations must suffice. Intelligence quotients, whatever they may mean, are certainly characteristic of various occupational groups. If we study the proportion in which these groups furnish children who become distinguished for intellectual achievement, as indicated by taking impartially chosen lists of great men, we find a similar gradation. One of the most significant studies bearing on our problem is Terman's inquiry into the parentage of 1,000 very exceptional children in the California schools. Only those children were chosen whose intelligence quotient was over 140, or above the highest one-half per cent. of the school population. The financial status of the parents of these children was not above that of the parents of children of ordinary intelligence who served as a control group. The home environment of the gifted children was probably a little more favourable than that of the rank and file of students, but there was little in their homes and nothing in their school experience which would account for the outstanding ability of these children. Their ability was manifested in pre-school years and persisted in a later period when a follow-up study was carried out, thus behaving very much like a characteristic due to internal factors and probably a result of heredity. This conclusion is strengthened by a study of these children's fathers who were found, as a rule, to follow occupations requiring a superior degree of intelligence. The largest proportion of them belonged to the professional classes, or what would correspond with Group I of the Registrar-General's classification. Those who fit into Group II contributed the next largest proportion. A smaller number came from the homes of skilled artisans, while unskilled labour contributed the lowest proportion of all, namely 0.2 per cent.

Of course, it may be objected that all this discussion of occupation mortality and intelligence is futile because the gradation of intelligence found in these occupations simply reflects the influence of environment and opportunity. But this objection encounters a serious difficulty in the fact, which is becoming more clearly established as the results of investigation accumulate, that the intelligence quotient is a very constant attribute of human beings, and when fairly estimated is normally capable of little modification. One cannot make good ability out of inborn dullness. Families show differences in ability far greater than those which training or cultural advantages are capable of producing. In the light of what is known of the distribution of test scores in occupational groups, one can only conclude that human beings are segregated to a large extent on the basis of inherited levels

of intelligence. Of course, all grades of ability may be found even in the lowest occupations, and sometimes very mediocre ability may get into the higher ones. We are dealing with conditions which apply to groups and to which there are many individual exceptions.

If the results of psychological tests are of any value whatever in gauging relative differences in ability, we are forced to conclude that the distribution of mortality in occupational groups affords at least a rough index of the action of natural selection in eliminating inferior intelligence. Inasmuch as the members of any occupational group vary greatly in mental qualities, there are probably marked variations in mortality, correlated with intelligence levels within each group. Dr. H. T. Ashby (*Infant Mortality*, p. 42), in speaking of investigations carried on in New York, remarks :

> " The unanimous opinion of the doctors who made the observations, was that neither the surroundings of the infant, nor the exact character of the milk obtained, were as important factors in the health of the infant as the intelligent care of the mother." And the same writer further states that, " Competent and good mothers are to be found living side by side in the same street with ignorant and careless ones. The husbands of each are earning very likely the same wages, yet the home of the one will be probably always clean, the children will also be clean and attend school regularly, while next door everything is dirt and squalor, and only two or three out of probably a large family have been successfully reared. The essential difference will be the amount of intelligence and care bestowed upon infant life."*

It is unfortunate that in studying our problem we are unable to get away from the discussion of social classes. If we could investigate directly the relation between mortality rates and levels of intelligence, quite regardless of social or occupational groups, it would be a much more satisfactory procedure. The eugenist has no concern with social groups *per se*. The data on intelligence quotients in occupational classes afford him about the only available material on an extensive scale bearing upon the relation between intelligence and selective elimination. If he would gain an insight into the workings of natural selection he must perforce use this material for what it is worth.

The complex economic system under which we live exposes people to very diverse conditions, which make very great differences in their average expectations of life. In a mainly pastoral or agricultural period of development, when people followed very similar pursuits and lived in much the same way, the incidence of mortality was doubtless much more uniform. Under such circumstances a high-grade moron with sufficient intelligence to follow the ordinary pursuits of his tribe would probably have nearly as good a chance as his neighbour, who might be a mute, inglorious Milton. The present economic order is much more deadly to people with dull minds.† It is not improbable that at present the intelligence quotient is on an average the most important single factor in survival. In proportion as we have developed a highly industrialized civilization, the main incidence of selection has been shifted from physical characteristics to mental traits. To a degree unparalleled in previous ages expectation of long life has come to depend upon better endowments of brains. The ministrations of natural selection therefore, in the restricted sense in which I have been employing the term, are working steadily to promote the evolution of intelligence.

THE DIFFERENTIAL BIRTH RATE

From the standpoint of eugenics, this is a highly satisfactory condition and one upon which we might be inclined to congratulate ourselves, were it not for the fact that

* See also *Poverty, Nutrition, and Growth*, a Report of the Medical Research Council, 1927.

† See the *Report of the Mental Deficiency Committee*. Part IV, page 95.

the effect of natural selection is probably more than counteracted by the dysgenic influence of the differential birth rate. After all, as was pointed out before, it is the net survival rate, or the surplus of births over deaths, that determines the direction of evolution. But we may at least hope that the future will bring a substantial reduction of the evils of differential fecundity. There is indeed some evidence that in certain large urban communities much progress toward this goal has already been made. If it is permissible for a eugenist to indulge now and then in a bit of optimism, he might picture an era, possibly far off, to be sure, when the fertility of subnormal humanity will be reduced below that of the bearers of superior heredity. When this happy condition arrives, the race will find itself once more on the highway toward real biological improvement. Unless the present operation of the differential death rate comes to be very profoundly modified, natural selection would then be working toward the promotion of eugenic progress. We cannot, of course, expect that natural selection will always continue to act as strongly as at present in the elimination of inferior types of mental heredity. The reduction of the death rate will probably occur in the future by saving more lives, especially in infancy, among the lower occupational groups, but as our present industrial civilization may be regarded for all practical purposes as a permanent condition, it will be a very long time before the differential death rate on the basis of levels of intelligence will be reduced to a factor of minor importance.

THE RESEARCH NEEDED

Whatever advances our race may make in the promotion of eugenic improvement, it will never be able to eliminate the relatively high death rate of inferior hereditary types. The reduction of mortality has probably occurred largely through the removal of non-selective, or mildly selective, causes of death, so that we have really succeeded in reducing the action of natural selection much less than is commonly imagined. Strive as we may to save our weaker fellow creatures from the consequences of their many and often obscure hereditary defects, we shall never have the knowledge, if we had the power, to substitute completely other factors for the operation of natural selection. The grim reaper will always aid us, as he has done in countless past ages, by his kindly ministrations. We need to have a better knowledge of his ways, for they are often mysterious, but it is to be hoped not past all finding out. What is especially needed is an abundance of full and accurate family records in different hereditary classes, with precise information as to the cause of death in each member. The essential thing to know is how people who die early differ from those who die late. And this knowledge should cover not only physical conditions, but also mental capacity. We should have therefore more accurate diagnosis of the causes of death and more adequate measures of real intelligence.

The principal reason why our knowledge of natural selection has made so little progress is because we really know so little about ourselves. I cannot see how our insight into the problem can be very greatly enhanced until we accumulate and record more facts about individual persons and the reasons why they die. This knowledge may be difficult to obtain and may come slowly, but it is essential for the real scientific treatment of our problem.

CONCLUSION

In the present lecture, I have attempted to bring together some scraps of information which have been gathered upon our topic and to point out some features of selective elimination which have not received so much attention. But I can report only very modest achievements in this field. We have scarcely progressed beyond the stage of learning what kinds of facts we need to know in order to find out how natural selection works. We know that it still works towards the elimination of undesir-

able types of humanity and that its workings have been greatly modified by social progress. In some respects it has doubtless been reduced in effectiveness; but I am convinced, even though no one else agrees with me, that in other ways it may be working more vigorously than ever. A factor of great biological importance it will always remain, do what we may, and however bungling our efforts at eugenic reform may prove to be, it will always aid in the development of a better adjusted race.

THE ETHICS OF STERILIZATION

Two Letters Provoked by Recent Opinions

From the Reverend Father M'Nabb, O.P.

SIR,—As you do me the honour to reply to my quotation from St. Thomas Aquinas by giving another quotation from St. Thomas, perhaps you would do me the favour to add a further word to the discussion.

1. My quotation was eminently relevant, " No one should unjustly hurt another in order to further the common good."* Although this principle was appealed to in the matter of injustice through false accusation, yet it was a broad principle of justice which would be *à fortiori* applicable to the matter of ' sterilization.'

2. I must express my gratitude that you have printed verbatim the whole article of St. Thomas. Discussion tends to be more prolonged than profitable when the authorities are merely referred to or are given in fragments. Moreover, it is all to the good that the most fundamental matter of social justice should be discussed, as Aquinas always discusses such matters, in the calm atmosphere of ethical principles. But though a scholarly discussion on sterilization by an appeal to ethical principles would be valuable, I feel I have no right to ask your hospitality for such a favour. Yet I should be glad to point out that your appeal to St. Thomas in support of sterilization is not valid.

3. You will notice that St. Thomas does not once mention the word " sterilization," but the word " mutilation." The reason for his silence is that there is a wide difference between the two words. St. Thomas takes mutilation to mean the " removal of a member of the human body." Sterilization is the " removal of a procreative member or element of the human *in order to prevent procreation.*"

St. Thomas wrote the article in order to prove what some denied, that it was lawful to save life by cutting off a limb. The very first objection is directed against those—Christian scientists before our day!—who argued that all mutilation or, as we should say, all amputation was against nature and therefore against morality.

But it is quite clear that, though amputation is not in itself morally evil, amputation done under certain circumstances, and especially under the circumstance of *aim* or *purpose,* may be morally evil. Thus amputation against the will of the amputated would be morally evil. Or again, if a Catholic surgeon removed the editor's eyes in order to damage the EUGENICS

* *Summa Theologica,* Part II, II*ae,* Q. lviii, Art. 3. In the same spirit St. Thomas, the Doctor Veritatis (Doctor of Truth), says : " It is not lawful to tell a lie in order to deliver another from any danger whatever " [*Ibid.,* Q.110. Art. 3].